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# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION.

### Improvements in and relating to the Production of Plaster Board.

We, THE BRITISH PLASTER BOARD (HOLDINGS) LIMITED, formerly known as The British Plaster Board, Limited, a British Company, of 82 Bath House, Piccadilly, London, W.1, (formerly of Morris House, 1-5 Jermyn Street, London, S.W.1) do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be described in and by the following statement:—

The present invention relates to the production of plaster board, that is to say building boards comprising a core of gypsum plaster lined on at least one and usually both faces with paper liners bonded to the plaster core.

The usual practice in the production of such boards is to feed and distribute a water-setting slurry of plaster of paris between two sheets or strips of paper drawn continuously between a pair of rollers arranged one above the other and spaced apart by a distance corresponding to the thickness of the board to be produced, and moving the formed plaster and paper sandwich on a conveyor for a period during which the plaster takes a set, and thereafter passing it through a heating and drying chamber usually after dividing the sandwich into desired lengths.

If attempts are made to apply two sheets of paper in the manner described above, to a core-forming slurry of neat plaster, or of plaster containing usual additions such as foam agents used to reduce the weight of the boards, setting accelerators and the like, the bond produced between the plaster core and the paper in boards so produced is ineffective, the paper being readily parted from the set core.

In order therefore to obtain a satisfactory bond between the core and the paper it is the present practice to embody in the core-

forming plaster slurry an adhesive usually of the nature of a starch, so that adhesion between the paper and the core is achieved. The need for such adhesives, however, involves a substantial addition to the cost of production of the board.

It has now been found that a very strong bond is obtained by first coating the paper sheet or sheets with a very thin layer of neat gypsum plaster on the surface thereof which is to be engaged with the core-forming plaster and thereafter bringing the thin coated surface or surfaces into contact with the core-forming plaster.

A very strong bond is obtained between the thin plaster layer and the paper even with no starch or other adhesive present in the plaster used to form the thin layer, and the thin layer when subsequently applied to the core-forming plaster combines therewith to form a homogeneous mass.

The invention accordingly consists in a method of producing plaster board paper-lined on one or both of the surfaces thereof, said method including the steps of applying a cream-like mixture of neat gypsum plaster in water on a surface of the paper-liner sheet or sheets and bringing the coated surface of the paper-liner sheet or sheets into engagement with the core-forming plaster.

In some cases a small proportion of starch, gum or other adhesive may be embodied in the otherwise neat gypsum plaster used to form the thin layer, but the use of such an adhesive in the core-forming plaster is unnecessary.

It will thus be seen that the need for starch or other adhesive is wholly or largely eliminated by the use of the present invention.

Good results have been obtained making use of a mixture of plaster in water and

comprising as an example 70 parts by weight of water to 100 parts by weight of neat plaster and such a cream may be spread by the use of upper lightly loaded chromium plated or other smooth surface spreading roller to provide a thin plaster layer on the paper sheet of a few, e.g. seven, thousandths of an inch thick. In some cases, however, two or more spreading rollers may be used in succession and the first of said rollers may be provided with surface projections e.g. left and right hand helical ridges to effect the preliminary spreading of the plaster cream.

The thus coated paper sheets may at any time, that is to say before or after the thin plaster cream has wholly set, be used in the production of the plaster board by bringing the thin-coated surface or surfaces into contact with the core-forming plaster slurry.

A lower or higher proportion of plaster than that named above can be used but with a higher proportion of plaster the spreading of the plaster cream to produce an even thin layer becomes more difficult.

The improved method of producing plaster board is well adapted to be carried out as a continuous process and an apparatus for carrying out to a continuous process as applied to the production of plaster board paper lined on both sides, is illustrated by way of example in the accompanying drawing in which:—

Fig. 1 is a view in side elevation of the part of the plaster board-forming apparatus relevant to the present invention;

Fig. 2 is a plan view of the part of the apparatus shown in Fig. 1; and

Fig. 3 shows a detail.

Referring to the drawings, 1 and 2 represent two continuous webs of liner paper drawn off from supply reels (not shown) and intended to form the upper and lower surface liners respectively of the plaster boards to be produced.

Core plaster slurry is delivered in well known manner on to the lower moving paper liner 2 by way of a chute 3 having an outlet 4 disposed over the centre of the paper web 2. The core plaster slurry is supplied continuously to the chute 3 from a suitable source (not shown); by means of an endless travelling band 5.

The web 2 with the core slurry thereon as indicated by 6 passes from below the chute 3 between a pair of rolls 7 together with the upper liner web 1 and the spacing of the rolls 7 is selected in accordance with the thickness of the plaster board to be produced.

The rate of feed of the core plaster slurry from the chute 3 is selected in relation to the speed of movement of the paper webs 1 and 2 so that the squeeze of the rolls 7 will cause the core slurry 6 to spread with

uniform thickness over a width corresponding to that of the required plaster board product.

The formed sandwich indicated at 8 in Fig. 1, of core plaster 6 and paper webs 1 and 2 pass from the rolls 7 onto an endless conveyor 9 on which it remains until it is set to an extent to permit it to be cut into lengths and handled for subsequent treatment such as heating to complete the set, all in well known manner.

In accordance with the present invention two further delivery chutes 10 and 11 are mounted in positions in which the respective paper webs 1 and 2 are required to pass beneath the outlets 12 and 13 thereof before reaching the point of application to the core plaster 6.

The plaster cream is supplied to the two chutes 10 and 11 from a source or sources (not shown) by means of endless conveyors 14 and 15, and is delivered from the outlets 12 and 13 of the chutes 10 and 11 on to the longitudinal centres of those surfaces of the moving webs 1 and 2 which are to be applied to the core-forming plaster slurry 6. Since in the case of the upper web 1 the side of the web which is to engage the core-forming plaster slurry 6 is ultimately the underside of that web, the said upper web 1 is led around a guide roller 16 which in conjunction with the upper of the two squeeze rollers 7, effects a reversal of the web 1, and the chute 10 supplying the plaster cream to the upper web 1 is located at a point preceding the guide roller 16 as shown in the drawings when the side of the web 1 to which the plaster cream is to be applied is for the time being uppermost.

The paper webs 1 and 2 with the plaster cream indicated by 17, thereon pass over tables 18 having flat smooth surfaces and beneath a roller, or in the case illustrated, two rollers 19 and 20 in succession mounted above the surfaces of the tables 18 and resting by their own weight or lightly loaded, upon the moving paper webs whereby the plaster cream is distributed or spread over the whole width of the webs 1 and 2.

The distance of travel of the webs 1 and 2 between the chutes 10 and 11 delivering the plaster cream and the chute 3 delivering the core-plaster slurry need only be sufficient to enable the plaster cream 17 to be effectively spread over the width of the paper webs before engagement is made with the core-plaster slurry 6.

In some cases the spreading roller or some or all of the spreading rollers for the plaster cream may with advantage be provided with relief projections on the surface thereof. Such a roller is illustrated by way of example in Fig. 3, the roller here shown being provided with right and left hand helically arranged ridges of small depth.

The core-forming plaster used in the formation of plaster board usually contains setting accelerators and the setting time for neat plaster as usually employed for the formation of the preliminary coating cream according to the present invention is long by comparison.

The slow setting of the neat plaster of the cream before it comes into contact with the core-forming plaster, however, presents no inconvenience but affords time for better absorption or penetration of the neat plaster of the cream into the paper webs before the recrystallisation takes place.

After the preliminary thin coating of plaster on the webs has been brought into contact with the core-forming plaster the early setting of the latter in itself induces an acceleration of the setting of the plaster of the preliminary thin coating.

What we claim is:—

1. A method of producing plaster board paper-lined on one or both of the surfaces thereof, said method including the steps of applying a cream-like mixture of neat gypsum plaster in water on a surface of the paper liner sheet or sheets and bringing the coated surface of the paper liner sheet or sheets into engagement with the core-forming plaster.

2. A method of producing plaster board as claimed in Claim 1 wherein a small proportion of starch, gum or other adhesive is included in the cream-like mixture of otherwise neat plaster and water.

3. A method as claimed in Claim 1 wherein the cream-like mixture applied to the web or webs comprises about 70 parts by weight of water and about 100 parts by weight of neat gypsum plaster.

4. Apparatus for the continuous production of plaster board comprising a plaster core paper-lined on both surfaces, and of the kind comprising a chute for delivering

core-forming plaster slurry on to a lower liner-paper web, and a pair of squeezing and spreading rolls between which the said lower liner-paper web with the core-plaster thereon together with an upper liner-paper web are passed to form a sandwich of core-plaster between two liner-papers constituting the plaster board, characterised by two further chutes provided for the delivery of a cream-like mixture of gypsum plaster in water on to each of the two liner-paper webs at points preceding the entry of the two webs and the core-forming plaster slurry between the said squeezing and spreading rolls, and one or more further spreading rollers associated with and located in advance of each one of the said two further chutes for spreading or distributing the cream-like mixture from the said two further chutes into thin layers across the width of the liner-paper webs before said webs come into contact with core-forming plaster slurry.

5. Apparatus as claimed in Claim 4 and including smooth surfaced tables in advance of each of the said two further chutes, the one or more further spreading rollers associated with each one of the said two further chutes being mounted above the respective smooth surfaced table for co-operation therewith in spreading or distributing the solution of plaster deposited on the related liner-paper web.

6. Apparatus as claimed in Claim 5 wherein at least one spreading roller associated with the two further chutes is provided on its surface with relief projections to assist the outward spread of the plaster solution.

7. Apparatus as claimed in Claim 5 wherein the relief projections are formed by left and right hand helical ridges.

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#### PROVISIONAL SPECIFICATION.

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The usual practice in the production of such boards is to feed and distribute a

water-setting slurry of plaster of paris between two sheets or strips of paper drawn continuously between a pair of rollers arranged one above the other and spaced apart by a distance corresponding to the thickness of the board to be produced, and moving the formed plaster and paper sandwich on a conveyor for a period during which the plaster takes a set, and thereafter passing it through a heating and drying chamber usually after dividing the sandwich into desired lengths.

If attempts are made to apply two sheets

of paper in the manner described above, to a core-forming slurry of neat plaster, or of plaster containing usual additions such as foam agents used to reduce the weight of the boards, setting accelerators and the like, the bond produced between the plaster core and the paper in boards so produced is ineffective, the paper being readily parted from the core.

In order therefore to obtain a satisfactory bond between the core and the paper it is the present practice to embody in the core-forming plaster slurry an adhesive usually of the nature of a starch, so that adhesion between the paper and the core is achieved. The need for such adhesives, however, involves a substantial addition to the cost of production of the board.

It has now been found that a very strong bond is obtained by first coating the paper sheet or sheets with a very thin layer of plaster on the surface thereof which is to be engaged with the core-forming plaster and thereafter bringing the thin coated surface or surfaces into contact with the core-forming plaster.

A very strong bond is obtained between the thin plaster layer and the paper even with no starch or other adhesive present in the plaster used to form the thin layer, and the thin layer when subsequently applied to the core-forming plaster combines therewith to form a homogeneous mass.

In some cases a small proportion of starch, gum or other adhesive may be embodied in the plaster used to form the thin layer, but the use of such an adhesive in the core-forming plaster is unnecessary.

It will thus be seen that the need for starch or other adhesive is wholly or largely eliminated by the use of the present invention.

The invention accordingly consists in a method of producing a plaster board, paper lined on one or both surfaces thereof, said method including the step of applying a thin layer of plaster to the surface of the paper-liner sheet or sheets intended to engage the core-forming plaster, as a preliminary to bringing the paper-liner sheet or sheets into engagement with the core-forming plaster slurry.

The preliminary thin coating layer of plaster may be formed by pouring on and distributing over the paper sheet a cream obtained by pre-mixing plaster and water, distribution being effected for example by drawing the paper over a flat smooth table and below a smooth roller mounted above the table.

Good results have been obtained making use of a solution of plaster in water and

comprising as an example 70 parts by weight of water to 100 parts by weight of neat plaster and such a cream may be spread by a lightly loaded chromium plated or other smooth surfaced roller to provide a thin plaster layer on the paper sheet of a few, e.g. seven, thousandths of an inch thick.

The thus coated paper sheets may at any time, that is to say before or after the thin plaster coating has wholly set, be used in the production of the plaster board by bringing the thin-coated surface or surfaces into contact with the core-forming plaster slurry.

A lower or higher proportion of plaster than that named above may be used but with a higher proportion of plaster the spreading of the plaster cream to produce an even thin layer becomes more difficult.

The improved method of producing plaster board is well adapted to be carried out as a continuous process, the application of the thin-coating of plaster being carried out upon the paper sheets at a point preceding the entry of said sheets between the core-slurry spreading rollers of a plaster board making apparatus of conventional form, and the distance between the point of application of the plaster solution and the spreading rollers need only to be sufficient to enable the cream to be effectively spread over the width of the paper sheets.

It will of course be understood that in the case of the upper paper sheet it must be passed around a reversing roller and the thin coating of plaster applied to the upper surface of that sheet before it reaches the reversing roller.

The core-forming plaster used in the formation of plaster board usually contains setting accelerators and the setting time for neat plaster as usually employed for the formation of the preliminary coating according to the present invention is long by comparison.

The slow setting of the neat plaster before it comes into contact with the core forming plaster, however, presents no inconvenience but affords time for better absorption or penetration of the neat plaster into the paper before the re-crystallisation takes place.

After the preliminary thin coating of plaster has been brought into contact with the core-forming plaster the early setting of the latter in itself induces an acceleration of the setting of the plaster of the thin coating.

Dated this 16th day of October, 1952.

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Fig.1.

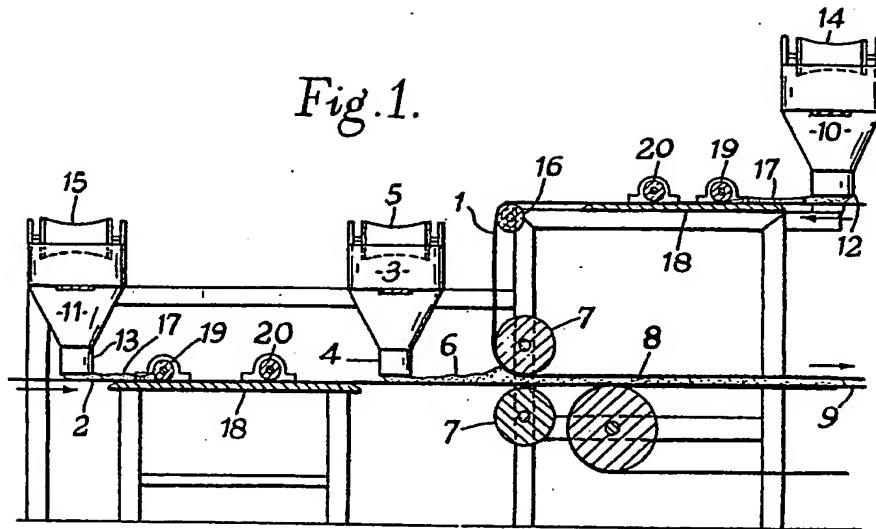


Fig.2.

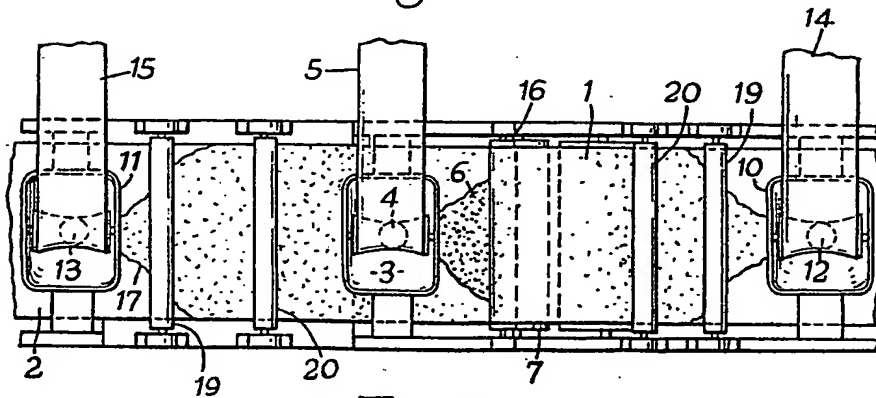


Fig.3.

